

**REMARKS**

Further consideration of this application courteously is solicited. By this paper, claim 21 has been canceled. The subject matter of claim 21 has been incorporated into each of independent claims 1 and 16 as they stand amended hereby. Care has been taken to avoid the introduction of new matter.

The December 3, 2010 Office Action states a number purported rejections. These begin with a rejection of claims 1, 2, 7, and 15 under 35 U.S.C. § 103(a) as purportedly obvious over U. S. Patent No. 6,130,145 (Ilg) in view of U.S. Patent No. 5,164,805 (Lee). Next, claim 8 has been rejected as purportedly obvious over Ilg and Lee, further in view of JP 10303412 (Komatsu). Next, claims 16-20, 22, and 25 were rejected as purportedly unpatentable over Ilg in view of U. S. Publication No. 2003/0143825 (Matsuo). Lastly, claims 21, 23, and 24 were rejected as purportedly obvious over Ilg in view of both Matsuo and Komatsu.

Given the introduction of the subject matter of claim 21 into each of independent claims 1 and 16, it courteously is urged that the first three above-stated rejections immediately are overcome. That is, the rejection of claims 1, 2, 7, and 15 over Ilg and Lee, the rejection of claim 8 over Ilg, Lee, and Komatsu, and the rejection of claims 16-20, 22, and 25 over Ilg and Matsuo, are overcome. None of these rejections contemplated Applicants' amendment of claims 1 and 16 to require a gate electrode produced with a metallic compound film that is formed by CVD using a material containing (i) a metal carbonyl, (ii) a C-containing material, and (iii) at least one of a Si-containing material and a N-containing material, such that the resulting compound film contains the metal from the carbonyl, the C, and at least one of the Si and N. None of these several asserted combinations of art addressed Applicants' semiconductor device and method for manufacturing such device (independent claims 1 and 16 respectively), and therefore withdrawal of each of these first three stated rejections courteously is solicited.

Focus will be turned to the rejection of claims 21, 23, and 24 over Ilg, Matsuo, and Komatsu. It will be addressed in connection with current independent claims 1 and 16. It is traversed.

Independent claims 1 and 16 result in a gate electrode with exceptually improved barrier properties. Examples of such are described at paragraphs [0034], [0039], [0041], and [0042] of Applicants' specification. Such superior barrier properties are obtained where the metallic compound film forming process (of the gate electrode) involves CVD using Applicants' recited material containing (i) the metal carbonyl, (ii) the C-containing material, and (iii) the material containing at least one of Si and N. Claims 1 and 16 do not end with this requirement for forming their metal compound film, but also require that the resulting film include the metal of the carbonyl, carbon (C), and one of Si and N. With these elements in the film, the film further must have a work function that is "controlled" (claim 1) or "adjusted" (claim 16) by the content of Si and/or N within the film.

Applicants respectfully urge that none of Ilg, Matsuo, or Komatsu teaches or suggests Applicants' requirements for formation of their gate electrode with their recited metallic compound film, and the resulting metallic compound film with its contents and controllable work function. In this regard, Ilg is noted, in the paragraph bridging columns 4 and 5, as disclosing a tungsten (W) precursor including tungsten hexacarbonyl ( $W[CO]_6$ ). According to this paragraph, a number of conventional Si precursors also are disclosed, as well as conventional CVD for forming Ilg's doped metal silicide layer 240 with the Si precursor and the W precursor. However, as admitted in the paragraph bridging pages 7 and 8 of the December 3, 2010 Office Action, Ilg still does not teach or suggest Applicants' resulting metallic compound film that must include each of the metal of the metal carbonyl, the carbon (C), and one of silicon (Si) and nitrogen (N), and that must also have the recited controllable or adjustable work function, depending upon the content of Si and N.

Nothing in Matsuo or Komatsu remedies the deficiencies of Ilg with respect to the final requirements for Applicants' recited metallic compound film. The December 3, 2010 Action makes an assertion that it would have been obvious to those of ordinary skill in the art to have used WCN interchangeably with Komatsu's  $WN_x$ . However, as the Action also points out, this was asserted for the purpose of forming a diffusion barrier, not barrier properties related to desired threshold voltage. Hence, nothing in the asserted combination would have led those of

ordinary skill in the art to a semiconductor device, or manufacturing method therefore, requiring Applicants' particular metallic compound film for a gate electrode, wherein the work function of such film particularly is controlled. Such an objective is not taught or suggested by the objective of producing a barrier to diffusion.

In this regard, Applicants point out that as amended, claim 1 describes a metallic compound film for a gate electrode that was indicated as patentable in the international preliminary report on patentability generated in connection with the parent application for this case, while the parent was in the international phase. See claim 6 as amended under Article 34 of the PCT in the parent case.

For at least these reasons, Applicants courteously urge that all of remaining claims 1, 2, 7, 8, 15-20, and 22-25 are allowable, and that this application is in condition for allowance. Favorable action in this regard earnestly is solicited.

If any other fees under 37 C.F.R. §§1.16 or 1.17 are due in connection with this filing, please charge the fees to Deposit Account No. 02-4300; Order No. **033082 M 334**. If an extension of time under 37 C.F.R. § 1.136 is necessary that is not accounted for in the papers filed herewith, such an extension is requested. The extension fee should be charged to Deposit Account No. 02-4300; Order No. **033082 M 334**.

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